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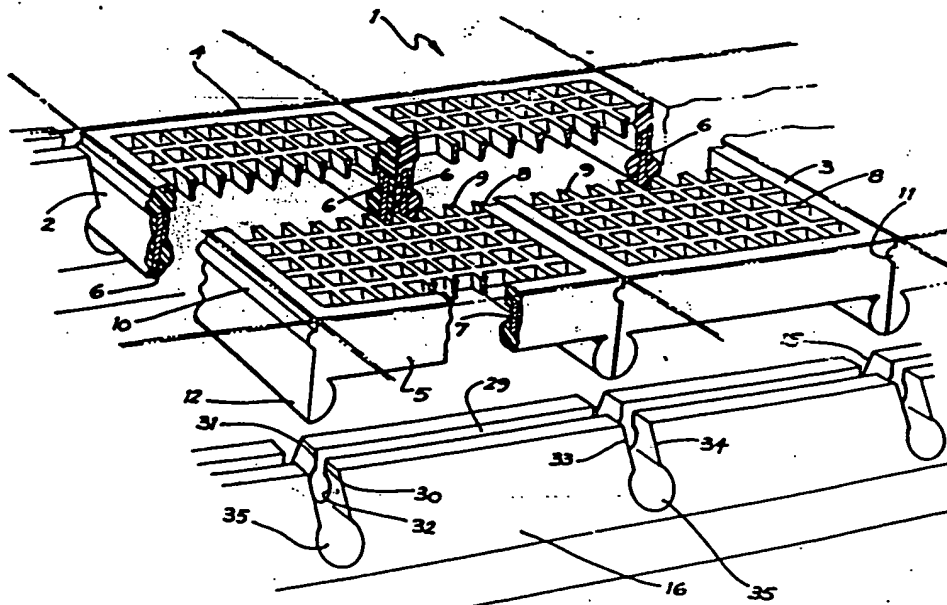
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(57) Abstract

A modular screening system includes a plurality of screening modules (1) supported in an interlocking manner on clamping bars (16) which are secured to and positioned across a screening machine in parallel spaced relationship. Each module (1) has a plurality of openings extending through it and a peripheral portion defined by side and end walls (4, 5; 2, 3). The side and end walls (4, 5; 2, 3) of each module (1) are provided with interengaging means (17; 14) which interlock with longitudinal and transverse channels (29; 15) in the clamping bars (16) to secure the module (1) in the machine. The end walls (2, 3) or each module (1) may also be provided with additional interengaging means (10; 11) whereby the modules (1) interlock together.

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The present invention relates to a new and improved modular screening system for use in screening machines.

Modular screening systems are known and were developed to overcome the problem of localised wear in a continuous screening mat which was used in such machines.

The present invention provides an improved modular screening system for use with screening machines.

In accordance with the present invention there is provided a modular screening system which includes:
10 a plurality of screening modules supported on clamping bars secured to and positioned across a screening machine in parallel space relationship, said modules having a peripheral portion defined by side and end walls and a plurality of openings extending through said modules inwardly of the
15 peripheral portion, the side and end wall of the modules being provided with inter engaging means which interlock with longitudinal and transverse channels in said clamping bars to secure said modules in position in the machine.

According to one embodiment the interengaging means
20 comprises protuberances on the side and end walls of each module.

In a modification the interengaging means comprises
25 protuberances on the inside faces of the side walls of the modules and a transverse rail interlocked with the end walls of the modules.

The invention will be now more particularly described with reference to the preferred embodiments shown in the accompanying drawings in which:



Figure 1 is an exploded perspective view illustrating two modules and two clamping bars according to one embodiment of the invention;

Figure 2 is a diagrammatic plan view of an assembly of modules;

Figure 3 is a diagrammatic side view in the direction of the arrow III on figure 2;

Figure 4 is a detailed cross sectional view on line IV-IV of the modules of figure 2;

10 Figure 5 is a detailed sectional view on line V-V of figure 2;

Figure 6 is a perspective view of the under sides of a module and

15 Figure 7 is a perspective view similar to figure 1 illustrating another embodiment of the invention.

Referring now to the drawings. The screening module is designated generally by the reference 1. It is preferably made from polyurethane and has ends 2 and 3 and sides 4 and 5 defining the peripheral portion of the module. The module is 20 conveniently formed in a molding operation, the peripheral portion is provided with reinforcement preferably in the form of steel strips or bars 6 and 7 and in addition the module is provided with a plurality of openings formed by longitudinal members 8 and transverse members 9. These members may be 25 provided with reinforcement in the form of reinforcing bars embedded in the longitudinal member 8 and transverse members 9. The size of the openings will be selected to suit the particular requirements of the material to be screened.



As illustrated in figure 1 adjoining modules are designed to interlock one with the other and to be firmly and accurately supported on clamping bars 16 in such a manner which will prevent small pieces of aggregate, dust particles and water from penetrating between mating surfaces thereby minimising wear. To this end each end wall 2 is provided with a longitudinally extending protuberance 10 while the opposite end 3 is provided with a longitudinally extending channel 11 as clearly shown in figure 5. The channel 11 is so shaped and dimensioned as to accurately accommodate the protuberance 10 of an adjoining module as illustrated in figure 5.

The end walls 2 and 3 each include an integral skirt portion 12 which extend below the bottom edge of the side walls 4 and 5 illustrated in figure 6. The inner face 13 of this skirt is provided with an arcuate shape protuberance 14 (figure 6). Whilst it is possible for these protuberances to extend throughout the length of the skirt it is preferred that they only extend for such a length as to be completely accommodated in a transverse channel designated generally by the reference 15 in the clamping bar 16 as illustrated in figure 1. The inner faces of the side walls 4 and 5 are each provided with a protuberance 17 which may extend throughout the length of the end walls or only part way as circumstances dictate.

The clamping bars 16 are also preferably made of polyurethane and extend over the length of the machine, the side wall of which are identified by the reference numerals



18 and 19 in figures 2 and 3. Each bar seats on support members 20, 21 and 22. The support members are preferably made from steel and are secured over the length of the machine in parallel spaced relationship. The members 20 and 21 are conveniently formed as right angle shaped bars, whilst the members 22 which are located in the centre of the machine are channel shaped for greater strength.

Each clamping bar 16 is provided with bores 23 which are spaced along each bar so as to register with the support members 20, 21 and 22. The bore passes through a reinforcing bar 24 embedded in the clamping bar during the manufacture thereof. Bolts 26 seating on washers 27 pass through holes 28 in the reinforcing bar 24 and are secured by nuts (not shown) to the support members 20, 21, and 22.

Each clamping bar is provided with a centrally located longitudinally extending channel 29 in its upper face and of course the transverse channels 15 previously referred to. The longitudinal channel 29 has straight side walls 30 and 31 forming lips leading to a circular shaped bottom portion 32. The transverse channels 15 likewise have straight side walls 33 and 34 also forming lips leading into a circular shaped bottom portion 35. As will be apparent from figure 1 the longitudinal channels 29 intersect the transverse channels 15 at right angles.

With the support members secured in the machine and the clamping bars secured to the support members in the manner previously described the screening modules 1 are locked in position as follows. The module is positioned on the

clamping bars with the end walls 2 and 3 in register with the horizontal channels 15 and the side walls 4 and 5 in register with the longitudinal channels 29. The module is then pressed downwardly so that the sides and end walls of the module enter the horizontal channels 15 and the longitudinal channels 29. Adjoining modules are positioned and locked in position in the same manner, there being sufficient resiliency in the lips formed by the walls 30, 31 and 33, 34 to permit the sides and ends of the module to be tightly locked in the respective channels.

As will be apparent from figure 1 the protuberances 10 of each module snap into the channel 11 of an adjoining module. The interlocking of adjoining modules and the locking of the respective modules to the clamping bar in the manner described insures a tight fit and so dust and aggregate particles and moisture cannot penetrate between the interfaces of the components thereby minimising wear and ensuring long life. Additionally no separate fastening means are used and worn or damaged modules may be removed and replaced in a matter of seconds.

Wear plates 36 are provided to protect the side walls 18 and 19 of the machine. These plates are preferably made from polyurethane and as indicated in figure 4 they include a longitudinally extending body having a downwardly extending tongue 37 having the bottom portion of its side face formed with a protuberance 38 of the same configuration as the bottom portion 35 of the channel 29. In use the tongue snaps into the longitudinal channel 29 and bears tightly against

the adjoining module and the wall.

Referring now to the embodiment of the invention illustrated in figure 7 in which like parts are given the same reference numerals as that of the previous embodiment.

The module 1 has end walls 2 and 3 and side walls 4 and 5 defining the peripheral portion of the module. As in the case of the previous embodiment the module is formed of polyurethane in a moulding operation. The peripheral portion does not however include the reinforcement described in the previous embodiment. The module is however provided with a plurality of apertures formed by the transverse members 8 and the longitudinal members 9.

In the case of this embodiment the bottom edge 39 of the end walls 2 and 3 is provided with a downwardly opening channel 40 having limbs 41 and 42. The inner face of the limb 41 is provided with an inwardly directed protuberance 43. The protuberance may extend throughout the length of the end walls of the module or it may only extend over a portion of the length as circumstances dictate.

The modules are supported on rails designated generally by the reference 45 which in turn are supported on the clamping bars 16. The bar 16 seats on the support members 20, 21 and 22 and is secured thereto by bolts 26. The clamping bars are provided with horizontal channels 15 and longitudinal channels 29 as described in the previous embodiment.

The rails 45 extend transversely across the machine and are adapted to seat in the transverse channels 15. Each rail

15 substantially U-shaped having a bight portion 46 with a reinforcing bar 47 embedded therein and extending throughout the length of the rail. Limbs 48 and 49 extend upwardly from the bight portion and define a channel 50. In order to ensure a tight interfit with the transverse channel 15 the outer faces of the side walls of the rail are provided with arcuate shaped protuberances 51 and the outer face of the bottom portion of the rails are rounded as at 52 to provide a section which is complementary to the shape of the transverse channels 15. As will be apparent from figure 7 the rails 45 snap into the transverse channels 15 and are tightly engaged thereby with the surface of the rails and the clamping bars being planar.

15 The clamping bars and rails form a grid like structure which extends across the machine and supports the modules. The modules are simply pressed into the longitudinal channels 29 and the channels 50 in the rails 45 with the protuberances 40 engaging the inner face of the channels 50. Adjoining modules are likewise pressed into their respective transverse and longitudinal channels thereby forming a rigid tightly interlocked screening structure.

20 As in the case of the previous embodiment worn or damaged modules may be replaced within a very short time without the necessity of releasing special securing means such as nuts, bolts, screws and the like. Wear plates 36 protect the sides 18 and 19 of the machine in the same manner as described with the reference to the previous embodiment.

The claims defining the invention are as follows:

1. A modular screening system including a plurality of screening modules supported on clamping bars secured to and positioned across a screening machine in parallel space relationship, said modules having a peripheral portion defined by side and end walls and a plurality of openings extending through said modules inwardly of the peripheral portion, the side and end wall of the modules being provided with inter engaging means which interlock with longitudinal and transverse channels in said clamping bars to secure said modules in position in the machine.
2. A module screening system as claimed in claim 1 wherein the inter engaging means comprises protuberances on the side and end walls of said modules.
3. A modular screening system as claimed in claim 2 wherein said transverse channels intercept said longitudinal channels at right angles, said transverse channels being deeper than said longitudinal channels and said transverse and longitudinal channels being keyhole shape in cross section.
4. A modular screening system as claimed in claim 3 wherein the inside faces of the side and end walls of each module are provided with a semicircular protuberances extending at least part way along the length of said walls, said protuberances and the adjoining wall sections being so dimensioned as to occupy one half the width of the transverse and longitudinal channels, the other half of the width of the said channels being occupied by the protuberances and adjoining wall sections of the side and end walls of an adjoining module whereby modules are locked in position on said clamping bars.



5. A modular screening system as claimed in one of claims 1 to 4 wherein the outer face of one end wall of each module is provided with a protuberance and the outer face of the other end wall of the module is provided with a corresponding channel, said protuberance and said channel extending the length of the end walls and being located adjacent the top edge thereof, the protuberance on one module being adapted to enter an interlock with the channel of an adjacent module whereby adjacent modules are interlocked.
6. A modular screening system as claimed in claim 1 wherein the side and end walls of each module have reinforcing bars embedded therein.
7. A modular screening system as claimed in claim 1 wherein said inter engaging means comprises protuberances on the inside faces of the side walls of said module and a transverse rail interlocked with said end walls.
8. A modular screening system as claimed in claim 7 wherein said transverse channels intercept said longitudinal channels at right angles, said transverse channels being deeper than said longitudinal channels and said transverse and longitudinal channels being keyhole shape in cross section.
9. A modular screening system as claimed in claim 8 wherein the said protuberances are semi-circular in cross-section and extend at least part way along the length of said side walls said protuberances and the adjoining section of the side walls being so dimensioned as to occupy one half of the width of the longitudinal channels, the other half of the width of said channels being occupied by the protuberances and adjoining wall section of an adjoining module.



10. A modular screening system as claimed in claim 9 wherein said transverse rail is formed with a channel in its upper edge extending throughout the length of the rail each side wall of said rail being provided with a protuberance extending at least part way along the length of said side walls, said protuberances and said rail forming a shaped which is complementary to the shape of said transverse channels and is adapted to be a snap fit therein.

11. A modular screening system as claimed in claim 10 wherein the bottom edge of the end wall of each module is provided with a downwardly opening channel, said channel having a protuberance extending inwardly into said channels and which is complementary in shape to the shape of half the cross-sectional shape half of the transverse channel in said rail, said protuberance being adapted to enter and seat in one half of said channel, the protuberance of an adjoining module being adapted to enter and seat in the other half of said channel whereby adjoining modules are locked to said transverse rail.

12. A modular screening system as claimed in claim 10 wherein said transverse rail has a reinforcing bar embedded therein.

13. A modular screening system as claimed in claims 1 or 7 wherein said clamping bar is secured to support members extending across said machine.

14. A modular screening system as claimed in claims 3 or 8 wherein wear plates are provided to protect the sides of the machine, said wear plates having a tongue extending from the bottom edge, the tongue being provided with a protuberance



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which is complementary in shape to half the cross-sectional
 width of said longitudinal channel, said tongue being
 adapted to enter into said channel and to be locked therein
 with the side walls of adjoining module.

15. A modular screening system substantially as hereinbefore
 described and illustrated in figures 1 to 6 of the
 accompanying drawings.

16. A modular screening system substantially as hereinbefore
 described and illustrated in figure 7 of the accompanying
 drawings.



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AMENDED CLAIMS

[received by the International Bureau on 09 April 1984 (09.04.84)
original claims 1-16 replaced by amended claims 1-15]

1. A modular screening system including a plurality of screening modules supported on clamping bars secured to and positioned across a screening machine in parallel space relationship, said modules having a peripheral portion defined by side and end walls and a plurality of openings extending through said modules inwardly of the peripheral portion, the side and end walls of the modules being provided with inter-engaging means which interlock with longitudinal and transverse channels in said clamping bars to secure said modules in position in the machine, the outer face of one end of each module being provided with a protuberance and the outer face of the other end wall of the module being provided with a corresponding channel, said protuberances and said channels extending the length of the end walls and being located adjacent the top edge thereof, the protuberances on one module being adapted to enter and interlock with the channel of an adjoining module whereby adjacent modules are interlocked.

2. A module screening system as claimed in claim 1 wherein the inter engaging means comprises protuberances on the side and end walls of said modules.

3. A modular screening system as claimed in claim 2 wherein said transverse channels intercept said longitudinal channels at right angles, said transverse channels being deeper than said longitudinal channels and said transverse and longitudinal channels being keyhole shape in cross section

4. A modular screening system as claimed in claim 3 wherein the inside faces of the side and end walls of each module are provided with a semicircular protuberances extending at least part way along the length of said walls, said protuberances and the adjoining wall sections being so dimensioned as to occupy one half the width of the transverse and longitudinal channels, the other half of the width of the said channels being occupied by the protuberances and adjoining wall sections of the side and end walls of an adjoining module whereby modules are locked in position on said clamping bars.

5. A modular screening system as claimed in claim 1 wherein the side and end walls of each module have reinforcing bars embedded therein.

6. A modular screening system as claimed in claim 1 wherein said inter engaging means comprises protuberances on the inside faces of the side walls of said module and a transverse rail interlocked with said end walls.

7. A modular screening system as claimed in claim 6 wherein said transverse channels intercept said longitudinal channels at right angles, said transverse channels being deeper than said longitudinal channels and said transverse and longitudinal channels being keyhole shape in cross section.

8. A modular screening system as claimed in claim 7 wherein the said protuberances are semi-circular in cross-section and extend at least part way along the length of said side



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walls said protuberances and the adjoining section of the side walls being so dimensioned as to occupy one half of the width of the longitudinal channels, the other half of the width of said channels being occupied by the protuberances and adjoining wall section of an adjoining module.

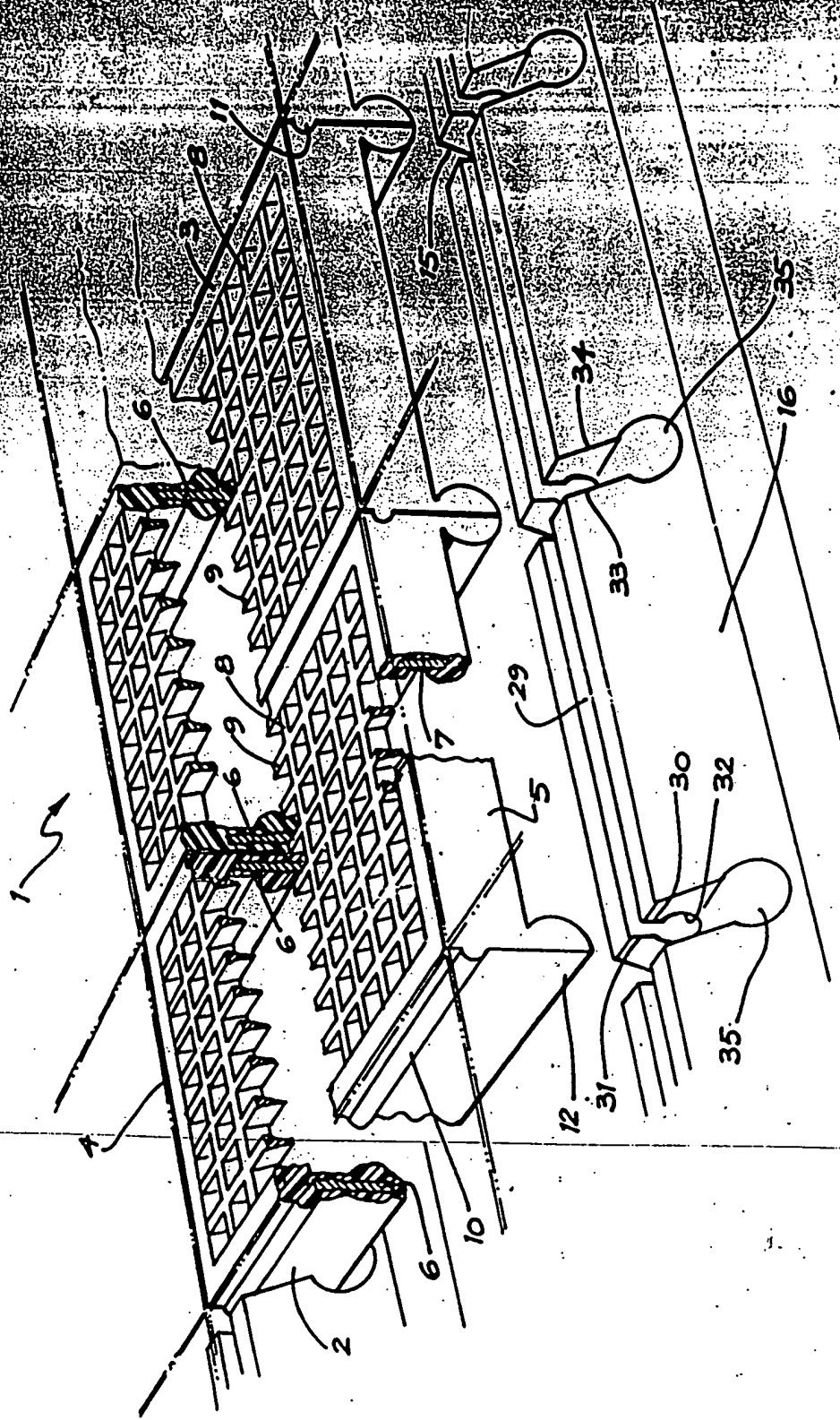
9. A modular screening system as claimed in Claim 8 wherein said transverse rail is formed with a channel in its upper edge extending throughout the length of the rail each side wall of said rail being provided with a protuberance extending at least part way along the length of said side walls, said protuberances and said rail forming a shape which is complementary to the shape of said transverse channels and is adapted to be a snap fit therein.

10. A modular screening system as claimed in claim 9 wherein the bottom edge of the end wall of each module is provided with a downwardly opening channel, said channel having a protuberance extending inwardly into said channels and which is complementary in shape to the shape of half the cross-sectional shape half of the transverse channel in said rail, said protuberance being adapted to enter and seat in one half of said channel, the protuberance of an adjoining module being adapted to enter and seat in the other half of said channel whereby adjoining modules are locked to said transverse rail.

11. A modular screening system as claimed in claim 9 wherein said transverse rail has a reinforcing bar embedded therein.

12. A modular screening system as claimed in claims 1 or 6 wherein said clamping bar is secured to support members extending across said machine.
13. A modular screening system as claimed in claims 3 or 7 wherein wear plates are provided to protect the sides of the machine, said wear plates having a tongue extending from the bottom edge, the tongue being provided with a protuberance which is complementary in shape to half the cross-sectional shape of said longitudinal channel, said tongue being adapted to enter into said channel and to be locked therein with the side walls of adjoining module.
14. A modular screening system substantially as hereinbefore described and illustrated in figures 1 to 6 of the accompanying drawings.
15. A modular screening system substantially as hereinbefore described and illustrated in figure 7 of the accompanying drawings.

FIG. 1



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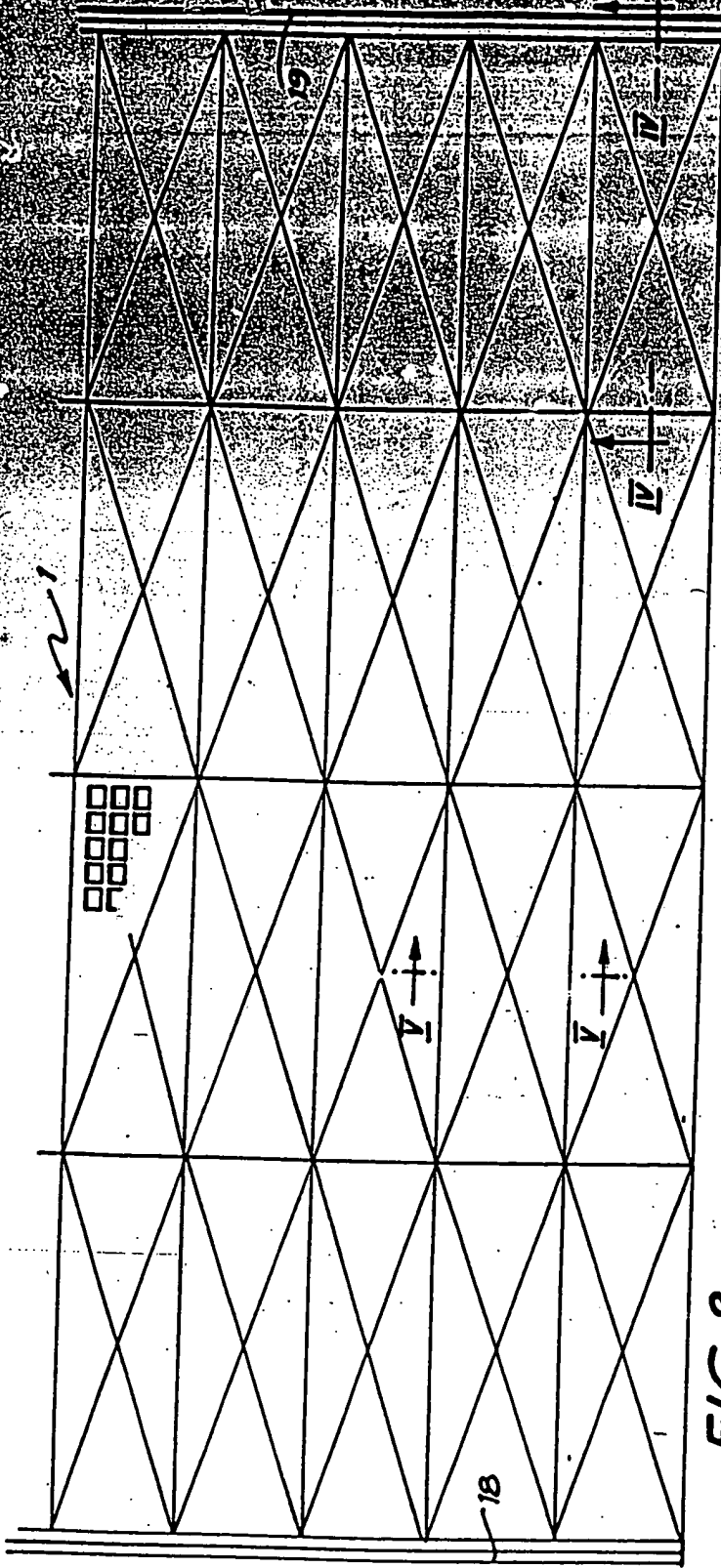


FIG. 2

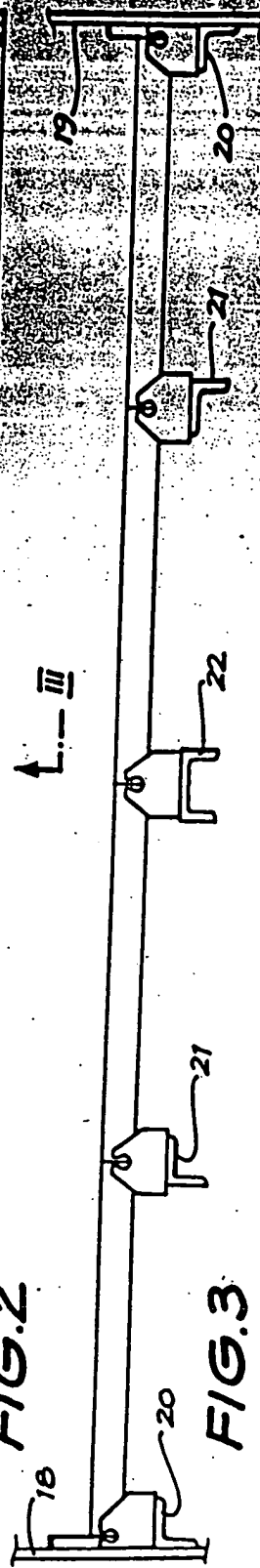


FIG. 3



FIG. 4

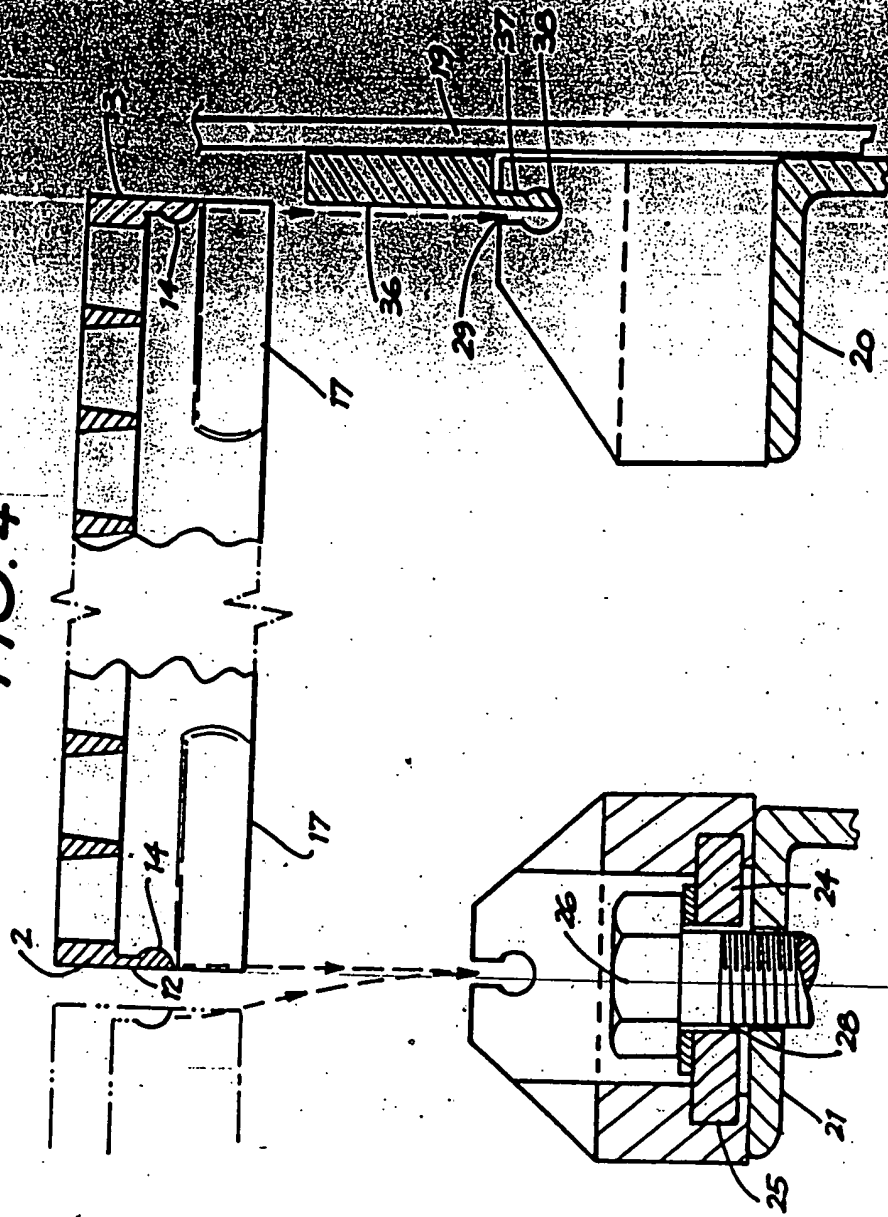
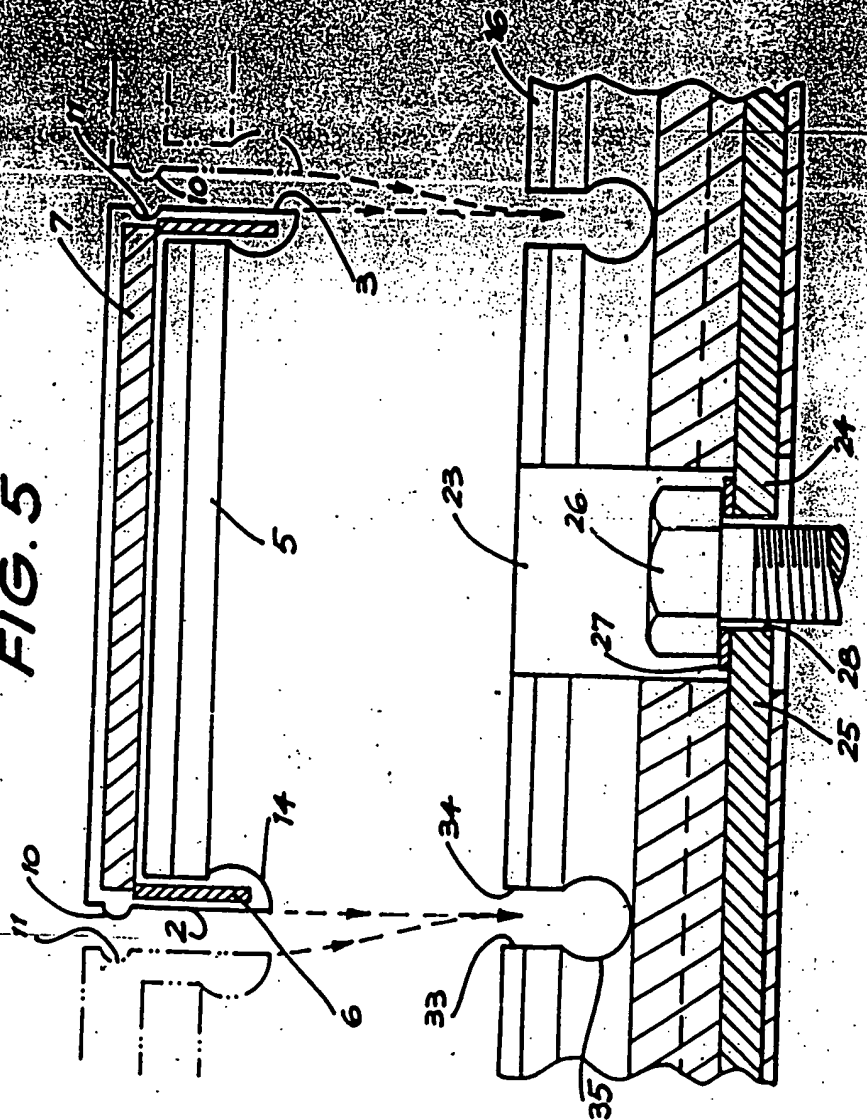


FIG. 5



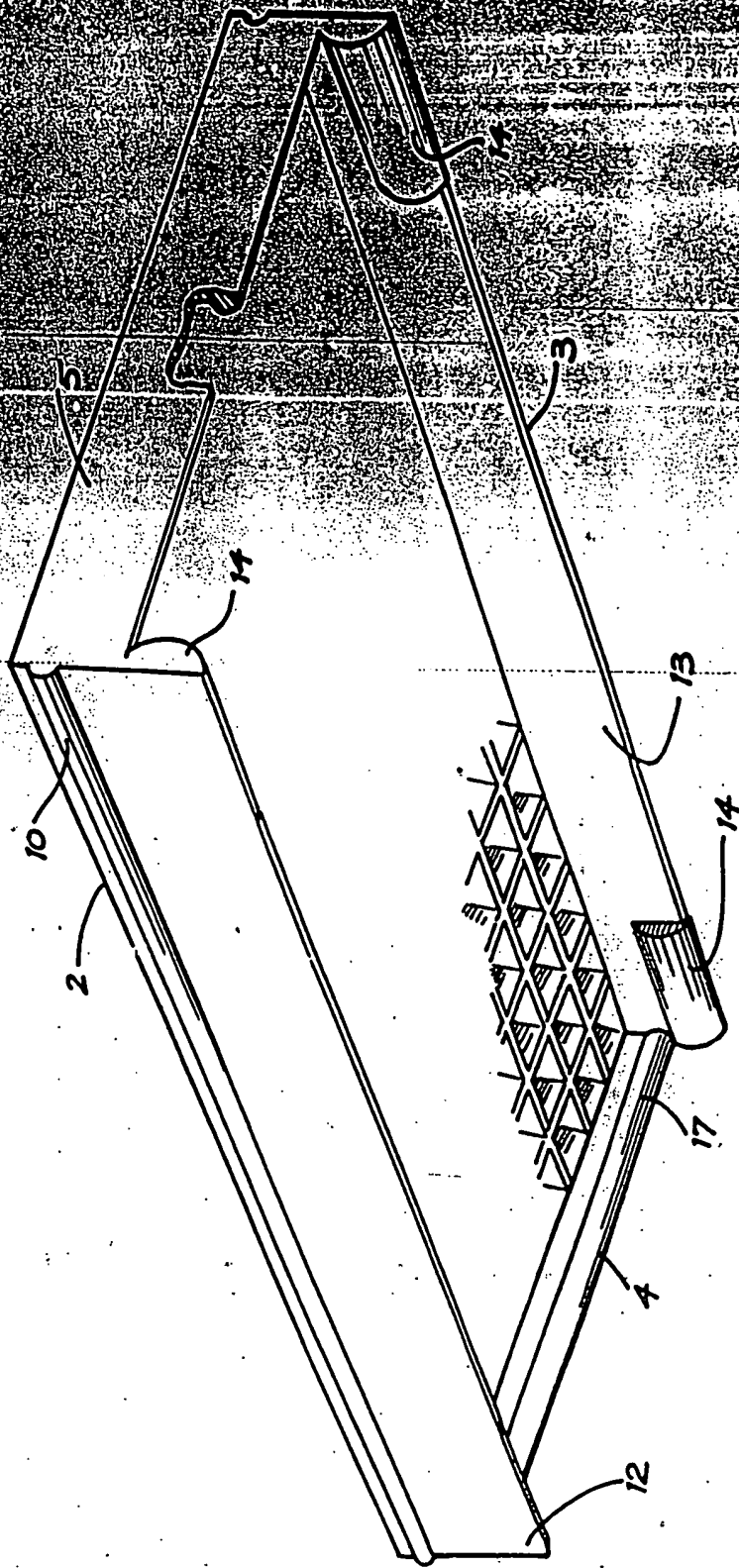


FIG. 6



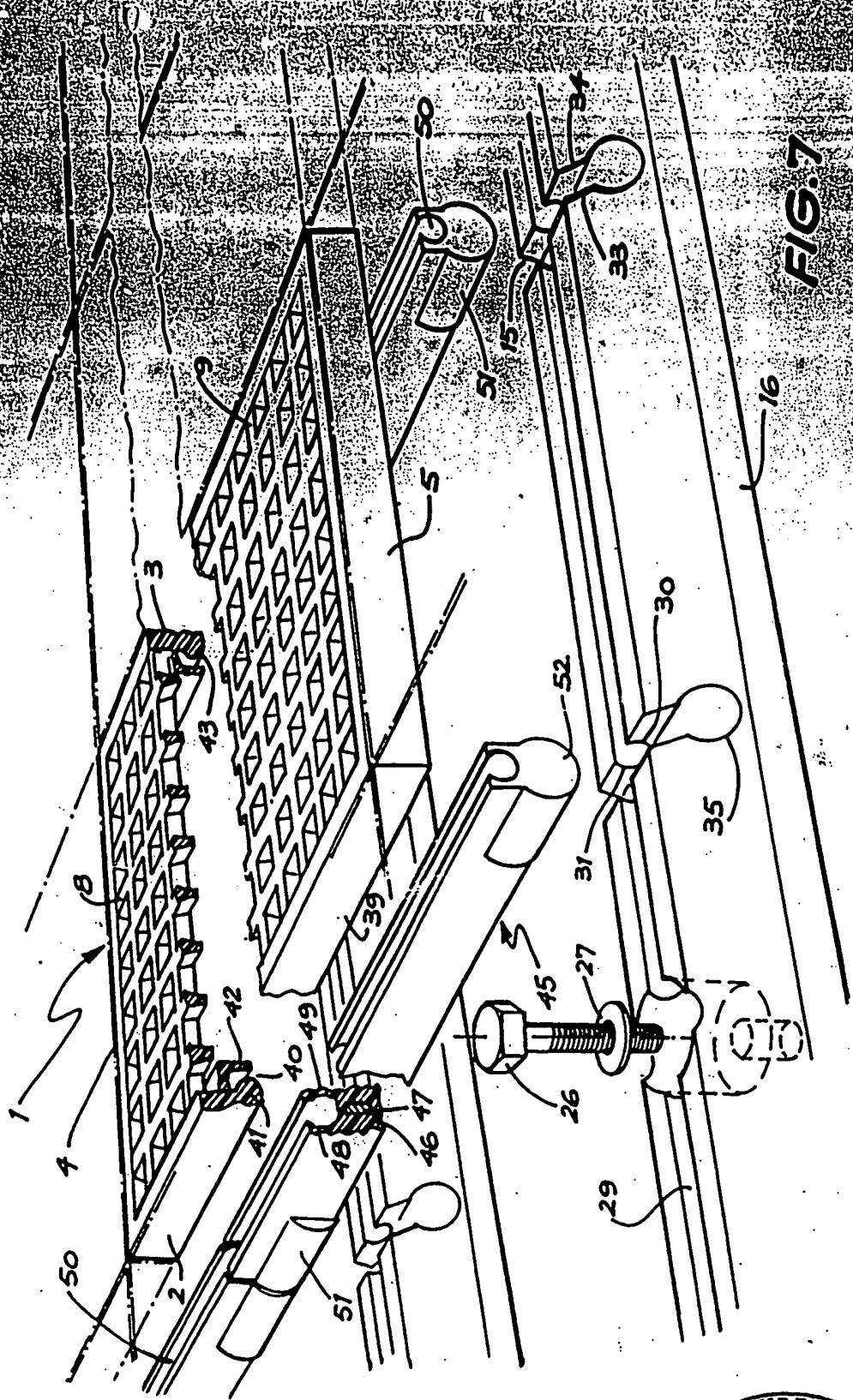


FIG. 7



INTERNATIONAL SEARCH REPORT

International Application No. **PCT/AU83/00161**

(I) CLASSIFICATION OF SUBJECT MATTER (Of several classification symbols (code), indicate all)
 (According to International Patent Classification (IPC) or to both National Classification and IPC)

Int. Cl. **B07B 1/46, 1/04**

(II) FIELDS SEARCHED

Minimum Documentation Searched:

Classification System	Classification Symbols
IPC	B07B 1/46
US Cl.	209/405

Documentation Searched other than Minimum Documentation
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AU: IPC as above; Australian Classification 11:35

(III) DOCUMENTS CONSIDERED TO BE RELEVANT:

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X	AU, B, 12698/76 (505116) (GREENINGS SOUTH AFRICA PTY. LTD.) 13 October 1977 (13.10.77)	(1,2,4,11,13)
X	AU, A, 48398/79 (HERRMANN SCREENS MANUFACTURING CO. PTY. LTD.) 8 January 1981 (08.01.81) See page 8, line 10 to page 9, line 7; page 11, lines 10 to 15; page 13, lines 5 to 15; Figs 1 to 3 (& US, A, 4265742)	(1,2,5,13-14)
X	AU, B, 29598/77 (512919) (N. GREENING LTD.) 26 April 1979 (26.04.79) See page 5, lines 4 to 23; page 6, lines 2 to 6; page 9, lines 15 to 19; Fig 3 (& US, A, 4219412)	(1-4,13)
Y	EP, A, 0032436 (N. GREENING LTD) 22 July 1981 (22.07.81) (& AU, A, 66007/81)	(1,2)
Y	GB, A, 2037618 (HEIN, LEHMANN AG) 16 July 1980 (16.07.80) See page 1, lines 120 to 121; Fig 2	(1,2,4,9,13)
A	US, A, 4120784 (HASSALL) 17 October 1978 (17.10.78) See Figs 1 & 6	(1,5)
A	EP, A, 0036486 (HEIN, LEHMANN AG) 30 September 1981 (30.09.81)	
A	AU, B, 72663/74 (482212) (SCREENEX WIRE WEAVING MANUFACTURERS PTY. LTD.) 26 February 1976 (26.02.76) (& US, A, 3980555)	

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IV. CERTIFICATION

Date of the Actual Completion of the International Search ¹	Date of Mailing of this International Search Report ¹
06 FEBRUARY 1984 (06.02.84)	05-02-84 8 FEBRUARY 1984
International Searching Authority ¹	Signature of Authorized Officer ¹¹
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